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VERIFICATION OF THE CHEMICAL WEAPONS CONVENTION: PRACTICE CHALLENGE INSPECTIONS AT CIVIL CHEMICAL PLANTS

Introduction

1. In CD921 and CD1012 the United Kingdom presented the results of its practice challenge inspection programme at government facilities. Our key conclusion was that there was no site so sensitive that we could not allow some form of access within the site, albeit rigorously managed. We subsequently decided to examine whether the lessons learned during the government programme were also relevant to inspections at civil chemical plants. One of the key issues we wished to examine was how to protect commercial confidentiality whilst still providing sufficient access for the inspectors. Accordingly one full practice challenge inspection at a large multi-purpose batch plant and a follow-up visit to a separate smaller dedicated plant were held in January and April this year. The follow-up visit was used to explore in detail some of the key lessons identified during the practice inspection. This visit reinforced many of the principal conclusions drawn in the full inspection.

Aims and Objectives

2. The inspection and follow-up visit had two major objectives:

(i) to test the effectiveness of challenge inspection at chemical plants, especially at large multi-purpose facilities.

(ii) to see whether sufficient access within the plant and to documentation could be given to demonstrate compliance without seriously compromising commercial confidentiality.

Conduct of the Exercise and Major Lessons

3. The first inspection involved an inspection team of 5 inspectors; a sampling team of 3; a receiving team of 9, including both government and company personnel; 2 control staff and one observer. For the purposes of the trial, it was agreed in advance to limit the inspection to one production area only within the large multi-purpose facility. This still provided a representative indication of the problems likely to be encountered in a real inspection, and contained sufficient interest to sustain two days of inspection. The follow-up visit focussed in greater depth on the scope for using a dedicated plant to make alternative products, the scope for diverting production, and examination of production, health, and safety records.

4. The civil inspection exercise reinforced many of the organisational and practical lessons learned during the government practice challenge inspection programme: for example, the importance of relevant expertise in both inspection and receiving teams; the requirement for well worked out sampling procedures and the need for clear rules for the challenging state observer (CSO). In the course of the inspection several valuable lessons were learned about the handling of challenge inspections at civil chemical plants. These can be summarised under the following headings: compliance assessment; records; commercial confidentiality; sampling practicalities; government expertise; and financial aspects. These issues are discussed in fuller detail below.

Compliance Assessment

5. From the inspectors' point of view, a challenge inspection at a chemical plant can present a more difficult task than at a military facility for the simple reason that the inspectors are "surrounded by chemistry". Inspectors therefore need to ensure particular precision in gathering information on chemicals present at the site, and this may require a more detailed analysis of the plant's activities to provide sufficient confidence in compliance.

6. If the request for an inspection does not give precise details of the compliance concern, the inspection team would have to rely on their own judgement in testing for particular Schedule 1 chemicals or other potential or known CW agents. In general an inspector's tasks might include the following:

- check for evidence of the presence of Schedule 1 chemicals on site shortly before the inspection;

- check that there are no chemicals on the site at the time of the inspection which are in contravention of the CWC, or inconsistent with declarations;

- check that any chemicals with CW potential are in fact being used for legitimate purposes and are not being diverted;

- look for evidence of possible violations in the recent past.

7. If a plant was designed with nerve agent production in mind, and was readily adaptable, this would probably be picked up quite easily by the inspectors, particularly if key precursors were present on site. Other CW agent production might be harder to detect. The inspection team would need to include at least one chemical process engineer familiar with requirements for classical CW agent production. Inspectors would also need to be aware of possible requirements for production of "novel agents". The inspectors could then target their efforts accordingly. A precise specification of the compliance concern in the inspection request eg "believe production of GB or GF occurring in..." would considerably facilitate inspection and analytical tasks, particularly at large complex chemical plants. It would also reduce the risks to commercial confidentiality since a less intrusive inspection may be required to satisfy the particular compliance concern in such circumstances.

8. The inspectors would have required a full 7 days to undertake an effective inspection of the whole of the large and complex chemical site which was the subject of the first UK trial. Despite potential practical and evidential difficulties we concluded that an inspection would have an important deterrent value. The inspected State would not know exactly which plant, and in what sort of detail, the inspectors would chose to examine over the 7 day period. Nor, moreover, could the challenged State be confident that all traces of potentially incriminating evidence could be completely removed.

Records

9. At the UK exercises, the inspectors did not, overall, find commercial confidentiality requirements a major obstacle to their assessment of the site's activities. The only problem of note they encountered concerned the analysis of records for a particular Schedule 3 chemical where the receiving team were initially prepared to offer only documentation from computer records to show inspectors that all materials were used as stated. This was regarded by the inspectors as of limited value in building confidence. Computer printouts, especially when produced in a location physically separate from the actual production line, do not have sufficient verisimilitude to provide convincing evidence. Sight of original hand-written records and invoices for the delivery of relevant chemicals would add considerably to the credibility of computer records. In the case mentioned above it proved possible to demonstrate a plausible internal consistency for randomly selected month, week and batch numbers, having been given some information on the raw materials for the product in question.

10. The effort involved in maintaining a second, false, set of records consistent with the scale of operations on site and internally consistent throughout would be considerable. Diversion of small percentages of chemicals could, however, be hidden within apparently legitimate mass balances. This suggests that using record analysis to verify such consistency, rather than for determining mass balances, may be a more effective use of inspection time and play a valuable role in verifying compliance at a chemical plant. To this end, the inspectors should consider examining laboratory quality control, maintenance, health and safety records, as well as production records. Some familiarity with industrial record keeping systems among the inspection team would obviously be helpful here. Access to sections of the overall records for periods in time selected by the inspection team would limit the amount of commercially sensitive information that needed to be divulged. But the ability to authenticate particular records by cross-checking throughout can provide greater confidence to the inspection team. The more transparent individual companies can be, the easier it is to demonstrate that all activities are indeed legitimate.

Commercial Confidentiality

11. Some attention has already been given in the negotiations to the question of protecting legitimate commercial secrets in the development of the Annex on the Protection of Confidential Information. In practice, as was evident in the UK exercises, private companies will naturally remain concerned not to reveal, even to the inspection team, any more confidential information than is necessary for the purposes of the inspection. They may be particularly concerned at the steady accumulation of information during the course of an inspection. Uncertainty on

the part of individuals at a plant as to how much information to reveal could lead to over-caution in responding to inspectors' questions. One way to address this problem might be for one or possibly a small core team of senior plant representatives to accompany the inspection team so that all questions and answers can be channelled through them. Individual companies might also consider preparing a general guidance note for all their manufacturing sites so that they can prepare, if necessary, relevant outline plans for receiving an inspection. Where there are particular concerns, companies could identify beforehand, as far as practicable, the most sensitive information and processes which they would prefer to protect, and consider how they would provide reassurance to inspectors if pressed on these points. Such plans might need to be updated from time to time to take account of any changes that may occur at the site. In practice general guidance may be all that is feasible or indeed necessary.

Sampling

12. Not surprisingly, sampling at the chemical plants proved to be a more complex activity than at our previous inspections at non-chemical sites. Industrial safety procedures for sampling hazardous materials were extremely stringent and required proper certification and the use of trained site personnel. In addition modern chemical plants may have long complicated pipe runs and not be readily susceptible to sampling at multiple points. In the first UK exercise the inspection team used process flow charts to follow through the production line of one product in order to identify the optimum sampling locations to verify that production was as claimed and that no controlled

chemicals were present. The company was particularly concerned about two of the chosen locations, fearing that detailed analysis would reveal sensitive data eg knowledge of reaction components which, if leaked, could provide competitors with details of reaction mechanisms. The inspection team overcame this problem by allowing the company to perform analysis in its own laboratories under their close supervision.

13. Since many classical CW agents contain phosphorus and sulphur, gas cromatography with flame photometric detection could be used. Alternatively, the use of Neutron Activation Analysis could be employed by the inspectors themselves. Both techniques could probably provide sufficient information to satisfy the inspectors without having to divulge commercial secrets. The method of element specific analysis, although widely applicable, may not work in every case, but the principle of negotiating restricted analytical methods can provide a valid approach to dealing with confidentiality concerns and might in some cases avoid the need for off-site analysis. In the UK exercise the company was able to find a way of satisfying the inspectors while keeping commercially sensitive information secret.

14. Six main conclusions were drawn on the practical aspects of sampling at chemical plants. These were:

- internationally acceptable safety certificates determining the intrinsic safety of electrical equipment would simplify and expedite home team clearance of approved items;

- inclusion in inspection teams and sampling teams of personnel fully conversant with the safety equipment (eg CCBA suits) necessary to enter particular plants would reduce or even preclude the need for in situ training and avoid opportunities for obstruction and delay on the part of the home team. This might require international agreement on universal standards;

- availability of process flow diagrams would allow sampling to be more specific and so reduce the numbers of samples that need to be taken;

- instruments, such as gravity meters, to assist in detecting underground systems would be useful;

- additional aids to sampling such as long handled dippers, extending vapour samplers etc (for vent sampling) would make the process easier at many locations within a chemical plant;

- sampling can be time-consuming and requires a team of at least 3 members for the task to be performed effectively and efficiently.

Financial Aspects

15. The direct costs of the inspection in terms of the provision of facilities were relatively minor, although there were additional resource implications in the involvement of company personnel. The key financial concern from the company's point of view is to ensure that their production and delivery schedule is not adversely affected since this can have potentially damaging economic consequences. As in the case of

IAEA safeguards, it needs to be stressed that inspection activities should not unduly interfere with legitimate production at civil chemical plants. At the same time it will be in the company's interests to be ready to propose ways of addressing the inspectors' concerns which minimise the impact on their legitimate activities eg sampling from adjacent areas, process flow diagrams, access to plant control instrumentation, waste outflows or treatment plants, feed stocks and filling points. Similarly, to enable the challenged site to be secured during the inspection whilst allowing legitimate activities to continue, the inspection team could allow traffic to move in and out of the site but subject it to random checking. This would give confidence that no CW-related material is being removed whilst not disrupting manufacturing and delivery schedules.

Government Expertise

16. Our practice challenge inspection programme at government facilities demonstrated the importance of government providing technical and policy advice and guidance for each challenged facility. Our recent trials showed this to be true also for civil chemical plants. We would envisage having a senior policy or military official to lead the home team and be the main point of contact with the inspectors rather than placing this burden on a site superintendant or plant manager. A national implementation committee might also be necessary to provide extra personnel and administrative support for escort duties and transport to reduce the burden placed on individual companies. Government expertise and advice on handling challenge inspections would need to be made generally available to the civil chemical industry. Chemical firms might wish to consider training designated personnel in the management and conduct of inspections. Practical experience gained from trial inspections should prove very valuable in preparing implementation procedures, particularly at sensitive sites.

Conclusions

17. Although the civil inspection programme was not as extensive as the trials at government facilities, the combination of a full practice challenge inspection at a large complex chemical plant and a follow-up visit to a smaller dedicated facility provided a useful insight into some specific aspects of handling challenge inspections at civil chemical sites and enabled some valuable lessons to be drawn. Our main conclusions were as follows:

(i) Concerns Over Commercial Confidentiality

The need to protect legitimate commercial confidentiality can be reconciled with an inspection team's requirements for extensive access. The duty of an inspection team not to interfere unreasonably with the legitimate work of a company should be spelt out in greater detail in the Inspection Protocol. If a stoppage of production is requested, companies should be ready to explain their difficulties and suggest how these might be overcome.

The chemical complexity of some sites and the size of some companies may make it difficult for companies to prepare thoroughly in advance for a possible inspection, but companies may find it useful to provide general guidance to their staff and to select local staff to receive and accompany any inspection team. Help in preparing for and receiving an inspection should be available from a government team of experts.

(ii) Sampling

The inspectors will need to be accompanied by a full team of properly trained and well equipped experts to carry out sampling. A system of international safety clearances, which the samplers would need to satisfy, would avoid repetition of safety training at each site. Element specific analysis and giving companies the opportunity to carry out analysis of samples themselves where possible, under the guidance of the inspectors, would help to protect confidentiality.

(iii) Detection of Non-Compliance

Although breach of the Convention might be more difficult to detect at a chemical site than at a military site, a wide ranging inspection based on examination of plant equipment and checking of records would present a significant risk of discovery to an evader.